EVOLUTION AND THE THEORY OF GAMES

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Exercises 19-10-2016

18. Consider the one-round *Courtship Game* where the players insist on either a short or a long courtship. If the players choose differently, the courtship cannot be completed to the satisfaction and has no further consequences. If the players choose the same, however, the courtship leads to the production of offspring. Let a and A denote the cost of, respectively, a short and a long courtship, with $0 < a < A$, and let V denote the value of the offspring. The payoff matrix is

	Short	Long
Short	$V - a$	$-a$
Long	$-a$	$V - A$

(payoffs to row player)

Find all EES-s of the one-round *Courtship Game.*

19. Consider the two-stage game $\Gamma = (\Gamma_1, \Gamma_2)$ where Γ_1 is the *Courtship Game* (see above) and Γ_2 the *Parenting Game* (alias *Who takes care of the Kids*, alias the *Battle of the Sexes*). In the first stage, a successful courtship is rewarded with a "ticket" to the second stage (as opposed to the direct reward V in the previous exercise). As usual, the discounting factor is denoted by $\delta \in (0, 1)$:

Γ_1	Short	Long
Short	$\delta\,\Gamma_2 - a$	$-a$
Long	$-a$	$\delta\,\Gamma_2 - A$

(payoffs to row player)

The second stage continues only as long as both parents stay with the kids:

Γ_2	Stay	Run
Stay	$V - C + \delta\,\Gamma_2$	$V - 2C$
Run	V	0

(payoffs to row player)

with $V > C > 0$. Give the strategy set of Γ if on all levels only pure strategies are allowed, and find all ESS-s. (Hint: Γ_2 is a *subgame* that by the principle of *subgame perfection* can be solved independently of Γ_1.) Express the results in the $(\delta, C/V)$ parameter space.

20. What would be the answer to question **19.** if both stages were played as asymmetric games (e.g., between male and female) but without changing the pay-offs?